

## Operational Description

The Mr. Butler Remote is a handheld remote control transmitter used to activate a remote control deadbolt receiver, toggling the engagement of the deadbolt. After activation, an audible signal is produced by the receiver indicating the locked or unlocked state of the deadbolt. The unit is powered by a 3 volt lithium coin cell and has a single push-button for activation. Actuating the pushbutton signals the digital controller chip, a Microchip HCS361, to transmit an activation code block. The controller is configured to send a code via OOK, PWM modulation by turning on a biasing signal to the low power, single transistor Colpitts oscillator. Frequency stabilization is provided by a single port SAW resonator, placed in parallel with the base biasing circuit. The oscillator tank coil serves as an integral magnetic loop antenna minimizing grounding requirements. There are no provisions for external antennas or grounding connections. An indicator LED lights when the transmitter biasing is active indicating battery condition and operation. The code block sent is a bit-stream sent at approximately 2k bits per second modulated at 33% pulse width on for a digital 0 and 66% pulse width on for a digital 1 signal. The bit-stream contains a synchronization header and fixed and variable bit fields. The fixed bit field contains coding identifying the individual transmitter, while the variable field contains a coded sequence number, which can be incremented in a non-obvious manor. The combination of the proper ID code and a decoded sequence number which is after the last received sequence code number is interpreted by the receiver as a subsequent toggle request transmission. Transmissions of individual codes are less than 100ms long and are repeated at a 50% duty cycle as long as the pushbutton is activated for up to 20 seconds. If the pushbutton is released during the transmission of a code block, transmission of the block is completed. Each new transmission request causes the deadbolt activator to toggle the state of the deadbolt of the door on which it is installed.